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#### ABSTRACT

A refractive laser surgery process is disclosed for using compact, low-cost ophthalmic laser systems which have computer-controlled scanning with a non-contact delivery device for both photo-ablation and photo-coagulation in corneal reshaping. The basic laser systems may include flash-lamp and diode pumped UV solid state lasers (193-215 nm), compact excimer laser (193 nm), free-running Er:glass (1.54 microns), Ho:YAG (2.1 microns), Q-switched Er:YAG (2.94 microns), and tunable IR lasers, (750-1100) nm and (2.5-3.2) microns. The advantages of the non-contact, scanning device used in the process over other prior art lasers include being safer, reduced cost, more compact and more precise and with greater flexibility. The theory of beam overlap and of ablation rate and coagulation patterns is also disclosed for system parameters. Lasers are selected with energy of (0.01-10) mJ, repetition rate of (1-10,000), pulse duration of 0.01 nanoseconds to a few hundreds of microseconds, and with spot size of (0.05-2) mm for use with refractive laser surgery.

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